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FLOOD INSURANCE STUDY

CITY OF JACKSONVILLE, FLORIDA

DUVAL COUNTY

VOLUME 1 OF 2

AUGUST 15, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER 120077

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CITY OF JACKSONVILLE,
DUVAL COUNTY,
FLORIDA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study revises and supersedes a previous Flood Insurance Study for the City of Jacksonville, Duval County, Florida (Reference 1). This information will be used by the community to update existing floodplain regulations as part of the regular phase of the National Flood Insurance Program. The information will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for McCoys Creek, the Ribault River, Sixmile Creek, Goodbys Creek, Cormorant Branch, Oldfield Creek, Strawberry Creek, the Ortego River, and McGirts Creek were obtained from the U.S. Army Corps of Engineers (COE) Flood Plain Management report for the City of Jacksonville (Reference 2). The hydrologic and hydraulic analyses for Hoguns Creek were obtained from a COE Special Flood Hazard Information report (Reference 3).

The hydrologic and hydraulic analyses for the remaining study streams were performed by Engineering Methods and Applications, Inc. (EMA) (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-84-C-1610. EMA also performed the floodway analyses for all streams studied in detail, and the coastal storm surge analyses for the St. Johns River, the Intracoastal Waterway, and the Atlantic Ocean. This study was completed in September 1987.

The wave height, erosion, and wave runup analyses for this study were performed by FEMA. This study was completed in September 1987.

1.3 Coordination

The initial coordination meeting was held on April 24, 1984, and attended by representatives of FEMA, the Study Contractor, the Jacksonville Planning Department, and the Jacksonville City Engineer's Office.

The following were also contacted for coordination of information for this study: the University of Florida, Bureau of Economic and Business Research; the Civil Defense Department; Constance C. Cummings, Irrigation Consultant; the COE, Jacksonville District; England, Thims & Miller, Inc.; the Florida Department of Transportation; the Florida East Coast Railway; the Florida Game and Freshwater Commission; Greene, Greene, Falck and Coalsen, P.A.; the Jacksonville Electric Authority; the Jacksonville Library; the Jacksonville Times Union; the National Ocean Service; the National Weather Service; the Northeast Florida Regional Planning Council; Prosser, Hallock & Kristoff, Inc.; Robert Angas Associates; Smith & Gillespie Engineers, Inc.; the St. Johns River Water Management District; the U.S. Climatic Survey; St. Johns and Duval Counties; the U.S. Department of Agriculture; and the U.S. Geological Survey (USGS).

On June 10, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Jacksonville, Duval County, Florida. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of the Atlantic Ocean, the Intracoastal Waterway, the St. Johns River, the Nassau River, Dunn Creek, Dunn Creek Tributary 1, Dunn Creek Tributary 2, Caney Branch, Rushing Branch, Jones Creek, Jones Creek Tributary, Ginhouse Creek, Pottsburg Creek, Tiger Hole Swamp, Julington Creek, Sweetwater Creek, Big Davis Creek, Oldfield Tributary, Sherman Creek, Sherman Creek Canal, Mt. Pleasant Creek, Tiger Pond Creek, Greenfield Creek, Pablo Creek, Box Branch, Cedar Swamp Creek, Sawmill Slough, Sawmill Slough Divergence Channel, Mill Dam Branch, Mill Dam Branch Canal, Open Creek, Open Creek Tributary 1, Open Creek Tributary 2, the Cedar River, Cedar Creek, Little Cedar Creek, the Trout River, Second Puncheon Branch, McCoys Creek, the Ribault River, Sixmile Creek, Goodbys Creek, Goodbys Creek Tributary 1, Goodbys Creek Tributary 2, Goodbys Creek Tributary 3, Cormorant Branch, Oldfield Creek, Strawberry Creek, Red Bay Branch, the Ortega River, Hoggpen Bayou, Sandalwood Canal, Hogans Creek, and McGirts Creek was studied in detail.

A detailed coastal flooding analysis was performed on the complete coastline of the City of Jacksonville, where the flooding sources are the St. Johns River, the Intracoastal Waterway, and the Atlantic Ocean.

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

APPROXIMATE SCALE

16 0 16 32 48 MILES

VICINITY MAP

Areas having low development potential or minimal flood hazards were previously studied using approximate analyses. The results were shown on the Flood Insurance Study for the City of Jacksonville (Reference 1) and are incorporated into this Flood Insurance Study.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through September 1992. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Jacksonville.

2.2 Community Description

The City of Jacksonville, located in the northeastern coastal region of Florida, is bordered on the north by Nassau County; on the west by Baker County; on the South by Clay and St. Johns Counties; and on the east by St. Johns County, the Atlantic Ocean, and the Cities of Jacksonville Beach, Neptune Beach, and Atlantic Beach. The community is served by U.S. Interstates 10, 95, and 295; U.S. Routes 1, 17, 23, and 90; State Roads 5, 10, 13, 105, 109, 111, 115, 163, 210, 211, and 228; the CSX railroad; the Norfolk Southern Railway; and the Florida East Coast Railway. The 1980 population of the City of Jacksonville was reported to be 540,920 (Reference 4).

The governments of the City of Jacksonville and Duval County were consolidated in October 1968. Today the entire county, with the exceptions of the Town of Baldwin and the Cities of Atlantic Beach, Neptune Beach, and Jacksonville Beach, is included within the jurisdiction of the metropolitan government of the City of Jacksonville.

The city's economy is quite diverse. Manufacturing of machinery and equipment, chemicals, bedding, fabricated metals, and construction materials are important industries. Although agriculture has declined with urbanization, timber and pulpwood production remain major activities involving 300,000 acres. The community is a regional center for rail, highway, and water transportation, the latter dependent upon the St. Johns River and the Intracoastal Waterway. The city is a major port for the southeast, serving as point of entry for a large volume of imported automobiles. It has also become a major southeast center for financial and insurance institutions.

Elevations average about 25 feet above sea level, ranging from sea level to approximately 190 feet above sea level in southwestern Jacksonville. The topography is mostly low, gently sloping to flat, and composed of a series of ancient marine terraces.

The climate of the City of Jacksonville is characterized by long, warm, humid summers and mild winters. The average temperature is about 53 degrees Fahrenheit (^{o}F) in January and 81^{o}F in August; the annual mean temperature is about 68^{o}F. The average annual rainfall is about 53 inches, and the heaviest rainfall occurs from June through October (Reference 5).

2.3 Principal Flood Problems

Flooding in the City of Jacksonville results from two major sources: rainfall runoff causing overflow of streams, ponding, and sheetflow; and hurricane storm surge causing extreme water levels in coastal and tidal regions. Wave action that accompanies northeasters can also cause coastal flooding and serious erosion, although extreme (100-year) levels are not to be expected from such storms. Major rainfall events can occur with hurricanes, tropical storms, northeasters, or localized thunderstorms. As a result of the flatness of the terrain, many inland areas are characterized by shallow flooding and ponding after heavy rainfalls.

Hurricanes and tropical storms are most likely to occur in September and October, although one of the more severe hurricanes to affect the community occurred in July 1926. The strongest storm in recent history to affect the region was Hurricane Dora of September 1964. Dora is the only storm to have produced hurricane-strength winds at Jacksonville International Airport. Traveling almost due west with its eye passing to the south, Dora produced maximum effects in the Jacksonville area; furthermore, it crossed the coast during normal high tide, compounding its flooding potential. Tides 5 to 7 feet above normal affected the coastal regions; levels 5 feet above normal were observed on the St. Johns River near the Clay County boundary.

Although Dora is the most severe storm in recent history to have affected Duval County, it should be noted that it was, nevertheless, a minimum-strength hurricane; far stronger storms have been felt in other coastal regions along the Atlantic Ocean both south and north of the community.

The most recent significant storm in the area was the Thanksgiving northeaster of 1984. Although this storm did not cause flooding at extreme levels, it did result in a great deal of erosion affecting the entire northeast coast of Florida.

Although heavy rains can also cause widespread flooding in the community, flood depths and damage are not extreme compared to the potential coastal hazard. The St. Johns River and its tributaries have so much capacity that excess runoff is quickly drained. Nevertheless, there are significant areas of flat, poorly-defined drainage throughout the county that are easily flooded to depths of two feet or more.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for

floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community. Analyses were also carried out to establish the peak elevation-frequency relationships for each coastal flooding source studied in detail.

The 10-, 50-, 100-, and 500-year discharges for the riverine flooding sources were determined using USGS regional regression equations (Reference 6). Adjustments were made to discharges of basins that are urbanized more than ten percent to account for faster runoff and lower infiltration rates in urban areas (Reference 7). A log-Pearson Type III analysis (Reference 8) was performed for gage data on Pablo Creek and Cedar Swamp Creek and compared with the regional discharges for the same basins. The results of the two methods were consistent; because of the short duration of the gage data (1974 to present), the regional values were adopted. A log-Pearson Type III analysis performed by the USGS for the gage on Big Davis Creek was used to weight the regional equations for that basin.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
BIG DAVIS CREEK					
at Interstate 95	14.8	1,182	1,985	2,342	3,434
at U.S. Route 1	13.6	1,120	1,870	2,210	3,240
about 1.2 miles upstream of U.S. Route 1	4.5	581	1,031	1,251	1,862

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
FOX BRANCH					
at mouth	9.8	834	1,474	1,791	2,676
about 1.8 miles upstream of mouth	7.3	717	1,272	1,547	2,324
GANEY BRANCH					
at mouth	3.2	573	955	1,148	1,651
CEDAR CREEK					
at CSX railroad	20.1	1,540	2,560	3,100	4,540
at Interstate 95	12.7	1,230	2,050	2,480	3,630
at Biscayne Boulevard	7.6	860	1,440	1,740	2,540
at Interstate 295	6.5	750	1,250	1,510	2,220
CEDAR RIVER					
at Blanding Blvd.	25.4	2,390	3,900	4,720	6,690
at San Juan Avenue	22.9	2,260	3,690	4,460	6,310
at Lane Avenue	10.9	1,290	2,140	2,570	3,640
at Stuart Avenue	8.0	1,070	1,760	2,120	2,990
at Pickettville Road	4.3	630	1,050	1,250	1,760
CEDAR SWAMP CREEK					
at mouth	3.7	454	813	989	1,478
at Beach Boulevard	1.1	174	321	394	611
DUNN CREEK					
at Faye Road	15.8	1,519	2,501	3,029	4,403
at Dunn Creek Road	7.3	969	1,603	1,934	2,788
at Starrat Road	2.9	533	889	1,068	1,536
DUNN CREEK TRIBUTARY 1					
at mouth	1.9	445	745	893	1,266
at New Berlin Road	1.2	327	551	658	928
DUNN CREEK TRIBUTARY 2					
at Webb Road	0.8	139	258	317	400[1]

[1]part of flow lost over drainage boundary

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
GINHOUSE CREEK					
at Holly Oaks Lake Dam	2.3	493	813	976	1,383
at Monument Road	1.9	437	721	866	1,225
at Atlantic Boulevard	0.5	142	238	285	409
GREENFIELD CREEK					
at mouth	2.5	418	704	846	1,222
just downstream of Atlantic Boulevard	1.2	276	467	559	800
JONES CREEK					
at Fort Caroline Road	3.8	622	1,022	1,228	1,730
at Atlantic Boulevard	0.9	258	431	516	728
JONES CREEK TRIBUTARY					
at mouth	0.6	153	255	306	437
at Atlantic Boulevard	0.5	105	178	214	309
JULINGTON CREEK					
at mouth	36.2	2,984	4,857	5,884	8,395
at Greenland Road	12.8	1,363	2,147	2,593	3,704
at Interstate 295	6.8	955	1,562	1,881	2,658
LITTLE CEDAR CREEK					
at mouth	6.5	670	1,120	1,350	1,950
at Interstate 95	5.3	630	1,050	1,270	1,830
at Airport Road	1.9	360	609	733	1,068
MILL DAM BRANCH					
at mouth	5.8	741	1,235	1,490	2,150
about 4500 feet downstream of Alumni Way	3.3	553	922	1,110	1,602
at Alumni Way	2.3	418	695	834	1,197
at Smokewood Drive	1.1	188	319	383	554
MT. PLEASANT CREEK					
at Mt. Pleasant Road	8.8	970	1,593	1,929	2,843
about 2.5 miles upstream of Mt. Pleasant Road	5.8	686	1,213	1,471	2,173
NASSAU RIVER					
at U.S. Route 17	282.6	7,935	13,310	15,970	22,990

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
THOMAS CREEK					
at New Kings Road	49.8	2,630	4,710	5,790	8,800
at Acree Road	29.9	1,987	3,905	4,970	8,138
OLDFIELD CREEK TRIBUTARY					
about 1,300 feet downstream of Old St. Augustine Road	0.6	185	312	384	555
OPEN CREEK					
at San Pablo Road	5.5	840	1,390	1,672	2,380
at Hodges Boulevard	1.3	368	615	736	1,043
OPEN CREEK TRIBUTARY 1					
about 0.25 mile upstream of mouth	0.7	226	383	458	651
OPEN CREEK TRIBUTARY 2					
about 0.35 mile upstream of mouth	0.8	151	255	307	443
PABLO CREEK					
at mouth	44.3	1,993	3,459	4,182	6,098
about 950 feet downstream of confluence of Mill Dam Branch	24.6	1,180	2,081	2,526	3,719
just downstream of confluence of Mill Dam Branch	17.4	932	1,652	2,009	2,967
POTTSBURG CREEK					
at Atlantic Boulevard	18.5	1,640	2,840	3,400	4,870
at Beach Boulevard	14.6	1,430	2,500	2,990	4,240
at J. Turner Butler Boulevard	6.8	780	1,450	1,700	2,400
RUSHING BRANCH					
at mouth	6.5	637	1,132	1,376	2,050
about 4,250 feet upstream of mouth	3.2	357	645	788	1,191

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SAWMILL SLOUGH					
at mouth	2.9	234	431	529	806
at UNF Drive	1.0	103	194	239	373
SECOND PUNCHEON BRANCH					
at mouth	8.1	1,124	1,839	2,220	3,230
about 1.5 miles upstream of mouth	6.3	946	1,545	1,869	2,720
at J. Turner Butler Boulevard	1.7	409	672	809	1,178
SHERMAN CREEK					
at Wonderwood Drive	1.41	152[2]	198[2]	226[2]	280[2]
about 0.81 mile upstream of C Street	0.6	114[3]	330[3]	437[3]	710[3]
SHERMAN CREEK CANAL					
at Wonderwood Drive	2.6	431[4]	527[4]	578[4]	727[4]
at State Road A1A	1.52	302[4]	314[4]	320[4]	353[4]
at upstream golf cart bridge	1.3	265	447	536	778
SWEETWATER CREEK					
at Ancona Drive East	4.4	593	993	1,196	1,721
at Florida East Coast Railway	3.9	420	756	921	1,379
TIGER HOLE SWAMP					
at mouth	1.6	337	604	733	1,083
about 1,600 feet upstream of mouth	1.2	274	493	599	884
TIGER POND CREEK					
at mouth	1.6	374	665	806	1,181

[2]stream overflows to lake on east side of stream; discharges calculated from split flow analysis

[3]includes discharge from Sherman Creek Canal flowing over basin boundary into Sherman Creek

[4]stream overflows to Sherman Creek; discharges calculated from split flow analysis

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
TROUT RIVER					
at Interstate 295	31.6	1,770	3,060	3,720	5,440
just upstream of confluence of Gulley Branch	26.6	1,540	2,670	3,250	4,760
at Old Kings Road	20.9	1,220	2,130	2,610	3,830
at Norfolk Southern Railway	14.1	1,070	1,880	2,280	3,340
MCCOYS CREEK					
at mouth	5.8	1,708	N/A	2,557	3,102
at Leland Street	3.6	1,269	N/A	1,933	2,365
just upstream of Southwest Branch	1.7	645	N/A	905	1,032
RIBAULT RIVER					
at mouth	32.3	4,370	N/A	7,250	9,600
at Moncrief Road	26.0	3,810	N/A	6,350	8,380
at confluence of Sixmile Creek	22.4	2,430	N/A	4,180	5,180
SIXMILE CREEK					
at New Kings Road	16.4	1,640	N/A	3,000	3,870
at Imeson Road	13.7	1,510	N/A	2,980	4,080
at Bulls Bay Highway	7.3	1,520	N/A	3,150	4,230
at Jones Road	4.8	880	N/A	1,790	2,480
NORTH FORK SIXMILE CREEK					
at Bulls Bay Highway	2.9	560	N/A	1,180	1,750
at Fish Road West	1.1	230	N/A	570	810
GOODBYS CREEK					
at mouth	6.3	1,490	N/A	2,570	3,380
at Sanchez Road	2.8	890	N/A	1,460	1,830
at San Clere Road	2.2	810	N/A	1,270	1,600
at Old Kings Road	0.8	290	N/A	490	760
at Praver Drive North	0.6	270	N/A	540	730
GOODBYS CREEK TRIBUTARY 1					
at mouth	2.5	420	N/A	750	1,020
at Sunbeam Road	1.6	110	N/A	180	260

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
GOODBYS CREEK TRIBUTARY 2					
at Craven Road	0.3	250	N/A	430	550
GOODBYS CREEK TRIBUTARY 3					
at Old Kings Road	0.6	170	N/A	320	390
CORMORANT BRANCH					
at mouth	2.4	515	N/A	1,005	1,410
at Marbon Road	1.7	366	N/A	745	1,075
at Acosta Road	1.3	298	N/A	608	880
at Loretto Road	0.7	200	N/A	408	570
OLDFIELD CREEK					
at mouth	5.1	713	N/A	1,469	2,181
at Loretto Road	2.5	393	N/A	808	1,154
at St. Joseph's Road	2.1	267	N/A	580	818
at Interstate 295	1.3	168	N/A	244	385
at Old St. Augustine Road	0.9	114	N/A	207	425
STRAWBERRY CREEK					
at mouth	6.7	1,300	N/A	2,210	2,870
at Arlington Road	6.3	1,330	N/A	2,280	2,940
at Arlington Expressway	2.7	580	N/A	880	1,070
at Mill Creek Road	2.4	660	N/A	1,100	1,400
at Lone Star Road	1.9	670	N/A	1,080	1,390
at Merrill Road	0.7	210	N/A	330	380
RED BAY BRANCH					
at Arlington Expressway	2.1	500	N/A	790	940
at Lone Star Road	1.6	610	N/A	1,030	1,220
ORTEGA RIVER					
at mouth	98.0	4,500	N/A	10,000	15,500
just downstream of confluence of Cedar River	63.0	3,150	N/A	7,200	11,000
at Timuquana Road	61.0	3,050	N/A	6,950	10,700
at Collins Road	51.0	2,800	N/A	6,050	8,950
at Kirwin Road	42.9	4,100	N/A	8,250	11,840
at 103rd Street	29.6	2,120	N/A	4,490	6,800

TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MCGIRTS CREEK					
at Normandy Boulevard	22.7	1,840	N/A	3,780	6,600
at Chaffee Road	16.6	1,680	N/A	3,640	5,050
at Beaver Street	8.3	1,700	N/A	3,930	5,760
at Old Plank Road	6.6	1,600	N/A	3,150	4,270
HOGPEN BAYOU					
just upstream of San Pablo Road	N/A	N/A	N/A	2,110	N/A
SANDALWOOD CANAL					
about 1.7 miles upstream of San Pablo Road	N/A	N/A	N/A	1,299	N/A

Hydrologic analyses for Hogans Creek (Reference 3), a tributary of the St. Johns River with an approximate drainage area of 3.4 square miles, were carried out by the COE using high-water marks obtained from the City of Jacksonville.

Inundation from the St. Johns River, the Intracoastal Waterway, and the Atlantic Ocean caused by passage of storms (storm surge) was determined by the joint probability method (Reference 9). The storm populations were described by probability distributions of five parameters that influence surge heights. These parameters were central pressure depression (which measures the intensity of the storm), radius to maximum winds, forward speed of the storm, shoreline crossing point, and crossing angle. These characteristics were described statistically based on an analysis of observed storms in the vicinity of the City of Jacksonville. Primary sources of data for this analysis were "Tropical Cyclones of the North Atlantic Ocean" (Reference 10); "Some Climatological Characteristics of Hurricanes and Tropical Storms, Gulf and East Coasts of the United States" (Reference 11); and "Meteorological Criteria for Standard Project Hurricane and Probable Maximum Hurricane Wind Fields, Gulf and East Coasts of the United States" (Reference 12); all by the National Oceanic and Atmospheric Administration (NOAA). A summary of the parameters used for the area is presented in Table 2, Parameter Values for Surge Elevations.

For areas subject to flooding directly from the Atlantic Ocean, the FEMA standard storm surge model (Reference 13) was used to simulate the coastal surge generated by any chosen storm (that is, any combination of the five storm parameters defined previously). By performing such simulations for a large number of storms, each of known total probability, the frequency distribution of surge height can be established as a function of coastal location. These distributions incorporate the large-scale surge behavior, but

CENTRAL PRESSURE DEPRESSION (MILLIBARS)	17	30	45	60	74	84
ASSIGNED PROBABILITIES	0.38	0.29	0.18	0.08	0.06	0.01
STORM RADIUS TO MAXIMUM WINDS (NAUTICAL MILES)	13		22		31	
PROBABILITY	0.33		0.33		0.33	
FORWARD SPEED (KNOTS)		8			13	
PROBABILITIES		0.50			0.50	
DIRECTION OF STORM PATH (DEGREES FROM TRUE NORTH)		270			310	
PROBABILITY		0.10			0.13	
FREQUENCY OF STORM OCCURRENCE (STORM/NAUTICAL MILE/YEAR)			.00117			

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

PARAMETER VALUES FOR SURGE ELEVATIONS
ENTERING

CENTRAL PRESSURE DEPRESSION (MILLIBARS)	17	30	45	60	74	84
ASSIGNED PROBABILITIES	0.38	0.29	0.18	0.08	0.06	0.01
STORM RADIUS TO MAXIMUM WINDS (NAUTICAL MILES)		16			29	
PROBABILITY		0.50			0.50	
FORWARD SPEED (KNOTS)		8			13	
PROBABILITIES		0.50			0.50	
DIRECTION OF STORM PATH (DEGREES FROM TRUE NORTH)				350		
PROBABILITY				0.20		
FREQUENCY OF STORM OCCURRENCE (STORM/NAUTICAL MILE/YEAR)		.00120				

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

PARAMETER VALUES FOR SURGE ELEVATIONS
ALONGSHORE

CENTRAL PRESSURE DEPRESSION (MILLIBARS)	14	27	37	46	54
ASSIGNED PROBABILITIES	0.58	0.27	0.08	0.06	0.01
STORM RADIUS TO MAXIMUM WINDS (NAUTICAL MILES)	16			25	
PROBABILITY	0.50			0.50	
FORWARD SPEED (KNOTS)	9			20	
PROBABILITIES	0.60			0.40	
DIRECTION OF STORM PATH (DEGREES FROM TRUE NORTH)	40				
PROBABILITY	0.57				
FREQUENCY OF STORM OCCURRENCE (STORM/NAUTICAL MILE/YEAR)	.00280				

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

PARAMETER VALUES FOR SURGE ELEVATIONS
EXITING

do not include an analysis of the added effects associated with much finer scale wave phenomena, such as wave height or runup. As the final step in the calculations, the astronomic tide for the region is then statistically combined with the computed storm surge to yield recurrence intervals of total water level.

Wave setup was determined to significantly contribute to the total stillwater flood levels along the Atlantic Ocean, the St. Johns River, and the Intracoastal Waterway. The amount of wave setup was calculated using the methodology outlined in the COE "Shore Protection Manual" (Reference 14).

The storm-surge elevations for the 10-, 50-, 100-, and 500-year floods have been determined for the City of Jacksonville and are shown in Table 3, Summary of Stillwater Elevations. The analyses reported herein reflect the stillwater elevations due to tidal and wind setup effects and include the contributions from wave action effects.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

For areas subject to stream overflow flooding, water-surface elevations of floods of the selected recurrence intervals were computed using the HEC-2 water-surface profile computer program (Reference 15). The starting water-surface elevation for most streams and tributaries was normal depth.

Cross sections for the backwater analysis of all streams studied in detail were obtained from field surveys, topographic maps (Reference 16), and aerial photographs with 2-foot contours produced for selected areas of the county (Reference 17). All bridges, dams, and culverts were surveyed to obtain elevation data and structural geometry. Areas for which new 2-foot contours were developed include Sherman Creek, the southern half of Sherman Creek Canal, Dunn Creek, Dunn Creek Tributaries 1 and 2, Caney Branch, Rushing Branch, portions of Cedar Swamp Creek, Sawmill Slough, Mill Dam Branch, Pablo Creek, Ginhouse Creek, Jones Creek, Jones Creek Tributary, Open Creek, Open Creek Tributaries 1 and 2, Pottsburg Creek north of J. Turner Butler Boulevard, Greenfield Creek, Mt. Pleasant Creek, and Tiger Pond Creek.

New floodway determinations were made for selected streams previously studied by the COE (Reference 2). Cross sections and structural geometry were obtained from the COE.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
1	0179	7.0	10.3	11.6[4]	15.0	VE	15 - 18
						AE	9 - 14
		4.8	7.5	8.9	10.9	VE	9 - 12
						AE	9 - 11
		3.9	6.2	7.3	9.5	VE	9 - 10
						AE	8 - 9
		3.6	5.4	6.5	8.3	VE	9
						AE	6 - 9
		3.2	4.6	4.9	6.6	AE	5 - 6
2	0179, 0191	7.0	10.2	11.5[4]	14.8	VE	15 - 18
						AE	13 - 14
		4.6	7.5	8.9	11.1	VE	11 - 14
						AE	9 - 11
		4.3	6.8	7.8	10.0	VE	10 - 11
						AE	8 - 10
		3.9	6.4	7.5	9.5	VE	9 - 11
						AE	8 - 9
		3.8	6.0	7.0	9.2	AE	8 - 9

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10 YEAR	50 YEAR	100 YEAR	500 YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
3	0187, 0191	6.8	9.7	11.1[4]	13.3	VE	(13 - 17)[3]
		5.7	8.5	9.9	12.1	VE AE	11 - 12 10 - 11
		4.3	6.8	7.8	10.0	VE AE	10 - 11 8 - 10
		3.9	6.5	7.9	10.4	VE AE	10 - 11 9 - 10
4	0187	6.8	9.7	11.1[4]	13.3	VE	21[3]
		4.4	6.9	8.0	9.9	VE AE	10 - 11 8 - 10
		4.3	6.8	7.8	10.0	VE AE	10 9 - 10
5	0187, 0189, 0193	6.8	9.7	11.1[4]	13.3	VE	21[3]
6	0187, 0189	6.9	10.2	11.4[4]	14.7	VE AE	18[3] 11 - 14
		5.9	9.1	10.4	13.7	VE AE	12 - 13 10 - 12

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
6	0187, 0189	4.2	7.0	8.3	10.5	VE AE	10 - 11 8 - 10
		4.4	6.9	8.0	9.9	AE	8 - 10
7	0189, 0252	6.9	10.2	11.4[4]	14.7	VE	(15 - 18)[3]
		4.2	7.2	8.4	11.0	AE	8 - 10
		4.0	6.6	8.0	10.0	VE AE	10 - 11 8 - 10
8	0167, 0251, 0252	6.8	10.1	11.3[4]	14.6	VE	(14 - 17)[3]
		4.2	7.2	8.5	11.0	VE AE	11 8 - 11
		3.9	6.5	7.8	9.9	VE AE	9 - 11 8 - 10
		3.3	5.6	6.8	9.2	VE AE	9 - 11 7 - 9

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10 YEAR	50 YEAR	100 YEAR	500 YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
9	0253	6.8	10.2	11.5[4]	14.6	VE	(14 - 18)[3]
	0169,0251	5.8	9.2	10.5	13.6	VE AE	13 11 - 12
		3.7	7.1	8.4	11.5	AE	8 - 10
		3.8	6.2	7.5	9.6	VE AE	9 - 10 7 - 9
		3.3	5.3	6.3	8.3	VE AE	8 - 10 6 - 8
10	0169,0251,0253	5.5	8.8	10.0	13.2	VE AE	12 - 13 10 - 12
		3.5	5.9	7.2	9.4	VE AE	9 - 10 7 - 9
		3.1	5.1	6.0	8.1	AE	6 - 8
11	0169, 0253	6.6	9.9	11.1[4]	14.3	VE	(13 - 17)[3]
		4.4	7.7	8.9	12.1	AE	9 - 11
		3.7	6.4	7.8	10.3	AE	8 - 10

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
11	0169,0253	3.5	6.0	7.2	9.4	AE	7 - 8
		3.4	5.8	7.1	9.2	VE AE	9 - 15 8 - 9
		2.9	4.8	5.9	7.7	VE AE	8 - 15 6 - 8
12	0253,0261	6.6	9.8	11.0[4]	14.2	VE	17[3]
		3.5	5.8	7.0	9.1	VE AE	9 - 12 7 - 9
		2.8	5.0	5.7	7.6	VE AE	8 - 9 6 - 8
		2.5	4.5	5.5	7.2	VE AE	8 - 9 6 - 8
13	0168,0261	6.6	9.8	11.0[4]	14.2	VE	21[3]
		3.4	5.6	6.7	8.9	VE AE	9 7 - 9
		3.2	5.7	7.2	9.2	AE	7 - 9

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
ATLANTIC OCEAN/ INTRACOASTAL WATERWAY							
13	0168,0261	3.0	4.9	6.0	7.5	VE AE	8 - 9 6 - 8
14	0242	6.5	9.8	11.0[4]	14.2	VE	(14 - 17)[3]
		3.4	5.6	6.7	8.9	VE AE	9 7 - 9
15	0242	6.5 3.1	9.8 5.3	11.0[4] 6.4	14.2 8.6	VE AE	(15-17)[3] 6 - 8
16	0241, 0242	6.5 2.7	9.7 4.7	10.9[4] 5.9	14.3 8.0	VE AE	21 6 - 8
17	0243	6.5 2.3	9.7 4.2	10.9[4] 5.4	14.3 7.3	VE AE	(14 - 17) 5 - 7
18	0243	6.5	9.7	10.9[4]	14.3	VE	17[3]
		2.2	4.1	5.2	7.2	VE AE	7 - 8 5 - 7
19	0243	6.5	9.7	10.9[4]	14.2	VE	(15 - 17)[3]
		2.2	4.1	5.2	7.2	VE AE	7 - 8 5 - 7

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ATLANTIC OCEAN/INTRACOASTAL WATERWAY

FLOODING SOURCE AND TRANSECT	FLOOD INSURANCE RATE MAP PANEL	STILLWATER ELEVATION (FEET NGVD)				ZONE	BASE FLOOD ELEVATION[1,2] (FEET NGVD)
		10-YEAR	50-YEAR	100-YEAR	500-YEAR		
ST. JOHN'S RIVER							
20	0162	2.5	4.5	5.4	6.8	VE AE	8 5 - 7
21	0162, 0241	2.5	4.5	5.4	6.8	VE AE	7 - 9 5 - 7
22	0161, 0163	2.4	4.4	5.4	6.7	VE AE	7 - 9 5 - 7
23	0142, 0144	2.4	4.5	5.6	7.10	VE AE	8 - 11 6 - 8
24	0141, 0144	2.0	3.6	5.1	5.7	VE AE	7 - 11 5 - 7
25	0142, 0143, 0144, 0162, 0206, 0208,	2.0	3.5	4.8	5.4	VE AE	7 - 13 5 - 7
26	0114,0204, 0206, 0208	2.2	4.1	5.3	6.3	VE AE	7 - 13 5 - 7
27	0161, 0163, 0204, 0206, 0208	2.0	3.5	4.8	5.4	VE AE	7 - 11 5 - 7
28	0202, 0204	1.9	3.1	4.4	4.8	VE AE	7 - 14 4 - 6
29	0152, 0202	2.5	4.4	5.8	6.6	VE AE	8 - 11 6 - 8

[1]ROUNDED TO THE NEAREST FOOT AND MAY INCLUDE EFFECTS OF WAVE ACTION
[2]DUE TO MAP SCALE LIMITATIONS, BASE FLOOD ELEVATIONS SHOWN ON MAP MAY REPRESENT AVERAGE ELEVATIONS FOR THE ZONES DEPICTED
[3]INCLUDE EFFECTS DUE TO WAVE RUNUP
[4]INCLUDES EFFECTS DUE TO WAVE SETUP

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

SUMMARY OF STILLWATER ELEVATIONS

ST. JOHN'S RIVER

Roughness coefficients (Manning's "n") used in the hydraulic computations were based on field observations, aerial photographs, and photographs of the streams and floodplain areas. Roughness values for the main channels range from 0.015 to 0.06 and values for the overbank areas range from 0.06 to 0.19 for all flood-frequency levels.

The following special considerations were made for some of the study streams: For Cedar Swamp Creek, Pablo Creek, and Sawmill Slough, stream cross sections were inferred by interpolation and from aerial photographs in certain regions to which landowners did not permit access by survey crews. For the Cedar River and its tributary, the flows were modeled between Interstate 10 and Beaver Street to accurately determine the 100-year flood elevation. For the floodway calculation, only the Cedar River was modeled, except at the confluence of the tributary. Appropriate adjustments were made to discharges and overbank geometry. Holly Oaks Lake is at the mouth of Ginhouse Creek; the HEC-2 program was used to determine weir flow at the dam and backwater upstream of the lake. For Mill Dam Branch, stream cross sections south of J. Turner Butler Boulevard were inferred from the best available data, which were limited as a result of denial of access by landowners; two small lakes in the area were not considered. For Open Creek Tributaries 1 and 2, starting elevations were assumed to be the corresponding frequency levels on Open Creek because the small basin size makes simultaneous floods likely. For Jones Creek Tributary, starting elevations were assumed to be equal to Jones Creek levels because of the small size of the basin. Sherman Creek is in a region of complicated flow patterns. Sherman Creek Canal flows over the basin divide into Sherman Creek at the 100-year level; return flow occurs via a canal between the two streams. Downstream flow is lost to lakes on the east side of the basin. Flow from Sherman Creek Canal is mingled with Sherman Creek at the 100-year level.

For Pottsburg Creek, the HEC-2 analysis was terminated at the culvert at Interstate 95 and an alternate approach was adopted upstream. This was necessary because the culvert is small and the storage volume available in the upstream adjacent canals and swamps is extremely large. The upstream level was determined by integrating inflow and outflow. Peak upstream levels determined the discharges used in the downstream HEC-2 analysis, with downstream subbasin areas appropriately adjusted.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Hydraulic analyses, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines.

The FEMA storm surge model (Reference 13) was used to simulate the hydrodynamic behavior of the surge generated by the various synthetic storms. This model uses a grid pattern approximating the geographical features of the study area and the adjoining areas. Surges were computed using grids of 5 by 5 nautical miles and 1 by 1 nautical mile, depending on the resolution required.

Underwater depths and land heights for the model grid systems were obtained from topographic maps (Reference 16) and aerial photographs (Reference 17).

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National Academy of Sciences (Reference 18). This method is based on the following major concepts. First, depth-limited waves in shallow water reach a maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions, such as sand dunes, dikes and seawalls, buildings, and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined using prescribed procedures (Reference 18). The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Wave heights were computed along transects (cross-section lines) located along the coastal areas, as illustrated in Figure 2, Transect Location Map, in accordance with the "Users Manual for Wave Height Analysis" (Reference 18). The transects were located with consideration given to the physical and cultural characteristics of the land so that they would closely represent conditions in their locality. Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, they were spaced at large intervals. It was also necessary to locate transects in areas where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

Each transect was taken perpendicular to the shoreline and extended inland to a point where wave action ceased. Along each transect, wave heights and elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. The stillwater elevations for the 100-year flood were used as the starting elevations for these computations. Wave heights were calculated to the nearest 0.1 foot, and wave elevations were determined at whole-foot increments along the transects. The location of the 3-foot breaking wave for determining the terminus of the V zone (area with velocity wave action) was computed at

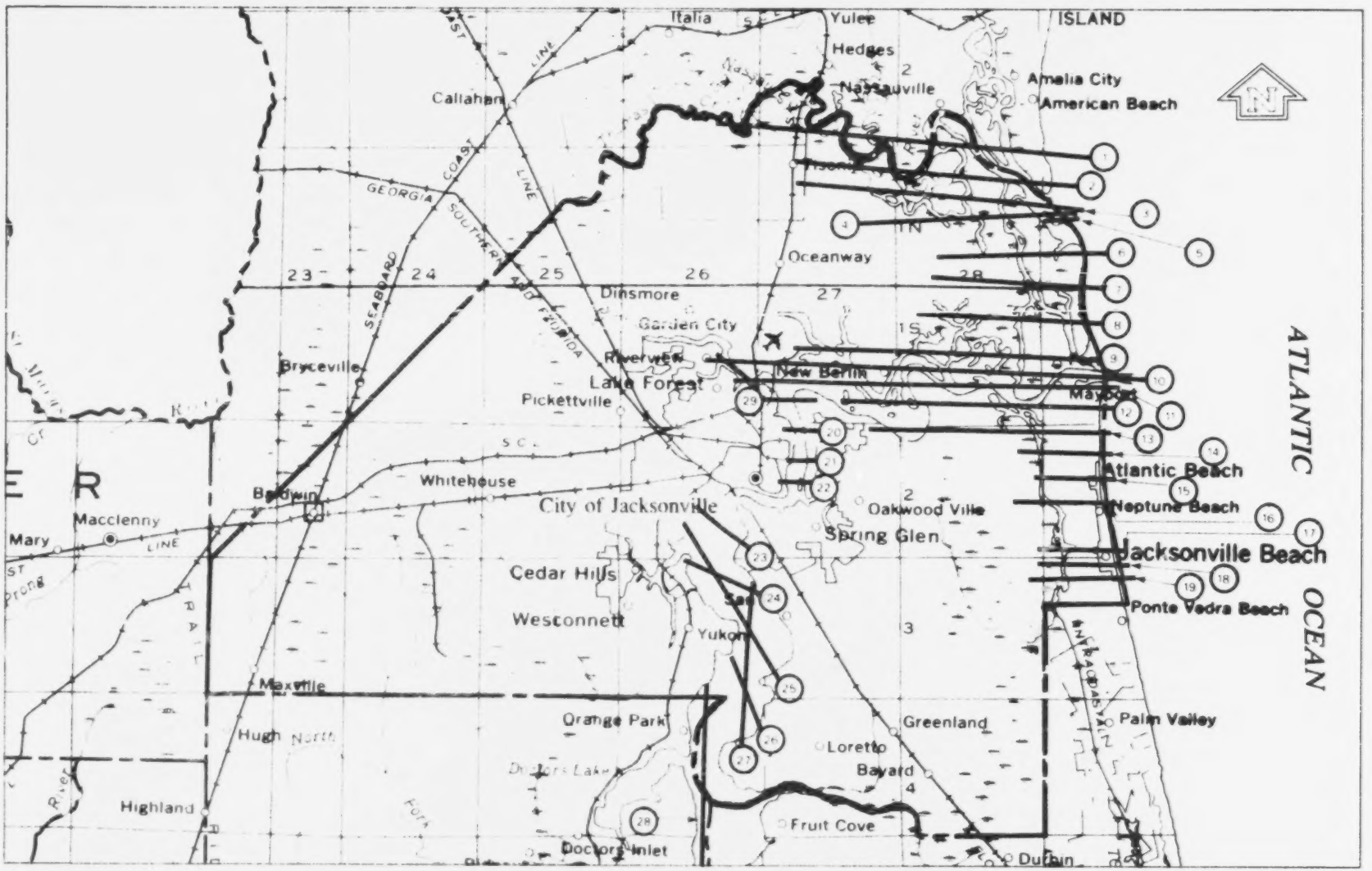

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

APPROXIMATE SCALE

6 0 6 12 18 MILES

TRANSECT LOCATION MAP

each transect. Also, along the open coast, the V zone designation applies to all areas seaward of the heel of the primary dune system. Table 4 provides a listing of the transect locations and stillwater starting elevations, as well as initial wave crest elevations.

Dune erosion was taken into account along the Atlantic Ocean coastline of Jacksonville (Reference 19).

In addition to the wave height analysis, wave runup was examined along the Atlantic Ocean coastline of Jacksonville and computed using the FEMA "Manual for Wave Runup Analysis, Coastal Flood Insurance Studies" (Reference 20). The area of Jacksonville affected by wave runup was designated as a shallow flooding area.

Figure 3 represents a sample transect that illustrates the relationship between the stillwater elevation, the wave crest elevation, the ground elevation profile, and the location of the V/A zone boundary.

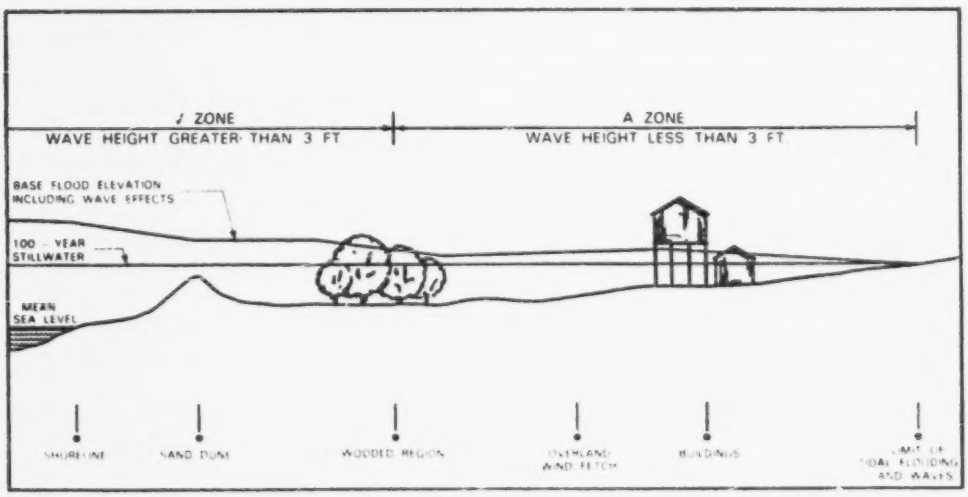

FIGURE 3 - Transect Schematic

After analyzing wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including topographic maps (Reference 16), beach profiles, aerial photographs (Reference 17), and engineering judgment. Controlling features affecting the elevations were identified and considered in relation to their positions at a particular transect and their variation between transects.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

TABLE 4 - TRANSECT LOCATIONS, STILLWATER STARTING ELEVATIONS, AND INITIAL WAVE CREST ELEVATIONS

TRANSECT	LOCATION	ELEVATION (FEET) STILLWATER	ELEVATION (FEET) WAVE CREST
1	From the Atlantic Ocean coastline 1.3 miles north of the north bank of Nassau Sound, extending west	11.6	18
2	From the Atlantic Ocean coastline 2,500 feet north of the north bank of Nassau Sound, extending west	11.5	18
3	From the Atlantic Ocean coastline 190 feet south of the south bank of Sawpit Creek, extending west	11.1	17
4	From the Atlantic Ocean coastline 1.2 miles south of the south bank of Sawpit Creek, extending west	11.1	21
5	From the Atlantic Ocean coastline 0.9 mile north of the north bank of Simpson Creek, extending west	11.1	21
6	From the Atlantic Ocean coastline 1,800 feet south of the south bank of Nassau Sound, extending west	11.4	18
7	From the Atlantic Ocean coastline 3.7 miles north of the north jetty (St. Johns River), extending west	11.4	18
8	From the Atlantic Ocean coastline 2.3 miles north of the north jetty (St. Johns River), extending west	11.3	17

TABLE 4 - TRANSECT LOCATIONS, STILLWATER STARTING ELEVATIONS, AND INITIAL WAVE CREST ELEVATIONS (Continued)

TRANSECT	LOCATION	ELEVATION (FEET) STILLWATER	ELEVATION (FEET) WAVE CREST
9	From the Atlantic Ocean coastline 0.8 mile north of the north jetty (St. Johns River), extending west	11.5	17
10	Through the St. Johns River Inlet, extending west through the intersection of Edgewood Drive and State Road A1A	10.0	13
11	From the Atlantic Ocean coastline 2,060 feet south of the south jetty (St. Johns River), extending west	11.1	17
12	From the Atlantic Ocean coastline 1,150 feet north of the intersection of Seminole Beach Road and Wonderwood Drive, extending west	11.0	17
13	From the Atlantic Ocean coastline 1.1 mile south of the intersection of Seminole Beach Road and Wonderwood Drive, extending west	11.0	21
14	From the Atlantic Ocean coastline 2,000 feet north of 14th Street, extending west	11.0	17
15	From the Atlantic Ocean coastline about 1,400 feet south of 14th Street, extending west	11.0	17
16	From the Atlantic Ocean coastline about 1,900 feet south of Atlantic Boulevard, extending west	11.0	17

TABLE 4 - TRANSECT LOCATIONS, STILLWATER STARTING ELEVATIONS, AND INITIAL WAVE CREST ELEVATIONS (Continued)

TRANSECT	LOCATION	ELEVATION (FEET) STILLWATER	ELEVATION (FEET) WAVE CREST
17	From the Atlantic Ocean coastline about 2,000 feet south of Seagate Avenue, extending west	10.9	17
18	From the Atlantic Ocean coastline about 100 feet south of 4th Street, extending west across the Intracoastal Waterway	10.9	17
19	From the Atlantic Ocean coastline at 22nd Avenue South, extending west across the Intracoastal Waterway	10.9	17
20	From the east bank of the St. Johns River about 2,300 feet south of Selton Avenue, extending west across the St. Johns River	5.4	8
21	From the east bank of the St. Johns River about 300 feet north of Floral Bluff Drive, extending west across the St. Johns River	5.4	9
22	From the east bank of the St. Johns River about 500 feet north of Matthews Bridge, extending west across the St. Johns River	5.4	9
23	From the east bank of the St. Johns River about 500 feet south of Inwood Terrace Drive, extending west across the St. Johns River to the intersection of Stockton Street and St. Johns Avenue	5.6	11

TABLE 4 – TRANSECT LOCATIONS, STILLWATER STARTING ELEVATIONS, AND INITIAL WAVE CREST ELEVATIONS (Continued)

TRANSECT	LOCATION	ELEVATION (FEET) STILLWATER	ELEVATION (FEET) WAVE CREST
24	From the east bank of the St. Johns River about 900 feet south of University Boulevard, extending west across the St. Johns River to the intersection of Grand Avenue and Ortega Boulevard	5.1	11
25	From the east bank of the St. Johns River at Cypress Shores Lane, extending north across the St. Johns River to the intersection of Avondale Avenue and St. Johns Avenue	4.8	13
26	From the east bank of the St. Johns River 500 feet north of the intersection of Brady Road and Mandarin Road, extending north across the St. Johns River	4.6	13
27	From the east bank of the St. Johns River at County Dock Road, extending north across the St. Johns River to Black Point	4.6	11
28	From the east bank of the St. Johns River about 1,000 feet west of the intersection of State Road 13 and Switzerland Airfield Road, extending north across the St. Johns River to the west bank at Interstate 295	4.4	14
29	From the west bank of the Trout River of Laura Street, extending north to the intersection of Bassett Drive and Carbondale Drive	5.8	11

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4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream or coastal flooding source studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section or transect. Between cross sections or transects, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 10 feet (Reference 16) and aerial photographs with a contour interval of 2 feet (Reference 17).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the flooding sources studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Insurance Study for the City of Jacksonville (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be

adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 5, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodways for the Nassau River, Thomas Creek, and Sherman Creek Canal lie outside the county boundary.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

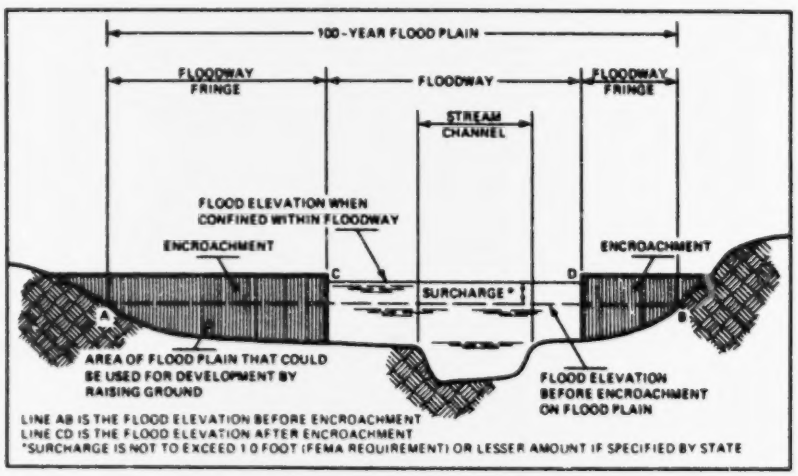
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 4 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
CEDAR RIVER								
A	4834	594	4327	1.1	6.0	2.9[2]	3.9	1.0
B	9490	336	2882	1.5	6.0	3.2[2]	4.1	0.9
C	11,430	194	1252	3.6	6.0	3.4[2]	4.2	0.8
D	16,826	161	925	2.8	6.4	6.4	6.6	0.2
E	18,490	161	880	2.9	7.6	7.6	7.6	0.0
F	20,523	85	607	4.2	9.4	9.4	9.7	0.3
G	22,431	206	834	2.8	11.3	11.3	11.5	0.2
H	24,381	306	950	2.2	13.4	13.4	13.6	0.2
I	25,042	91	881	2.4	16.4	16.4	16.8	0.4
J	25,458	1245	4757	0.4	16.6	16.6	17.0	0.4
K	26,136	1334	6998	0.3	16.7	16.7	17.1	0.4
L	26,480	857	2692	0.5	16.7	16.7	17.1	0.4
M	27,070	952	2626	0.5	16.8	16.8	17.2	0.4
N	28,647	531	1835	0.7	17.8	17.8	18.0	0.2
O	30,597	463	1299	1.0	18.2	18.2	18.8	0.6
P	32,527	233	1011	1.3	19.7	19.7	20.4	0.7
Q	32,982	148	730	1.8	20.8	20.8	21.5	0.7
R	33,369	40	304	4.1	22.1	22.1	22.6	0.5

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

CEDAR RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
TROUT RIVER								
A	235	253	1336	2.8	6.0	0.2[4]	1.1	0.9
B	6730	155	1092	3.0	6.0	2.7[4]	3.1	0.4
C	11,330	153	996	3.3	6.0	4.3[4]	4.6	0.3
D	12,747	94	855	3.8	6.0	4.9[4]	5.1	0.2
E	16,376	112	794	3.3	7.3	7.3	7.4	0.1
F	17,372	82	558	4.7	8.6	8.6	8.6	0.0
G	21,802	278	1388	1.9	16.4	16.4	16.7	0.3
NASSAU RIVER								
A	83[2]	371[3]	4358	3.7	8.5	-2.1[5]	-1.1	1.0
B	5697[2]	552[3]	9309	1.7	6.0	-1.4[5]	-0.5	0.9
C	22,410[2]	336[3]	6302	2.5	6.0	-0.7[5]	0.1	0.8
THOMAS CREEK								
D	51,760[2]	1253[3]	3100	2.3	6.0	3.9[5]	4.1	0.2
E	98,400[2]	1701[3]	14470	0.5	10.8	10.8	11.6	0.8
F	129,891[2]	1296[3]	13609	0.5	14.6	14.6	15.5	0.9
G	141,389[2]	1128[3]	9189	0.6	16.0	16.0	17.0	1.0
H	147,267[2]	1926[3]	15357	0.4	18.0	18.0	19.0	1.0
I	163,332[2]	865[3]	5862	0.8	19.9	19.9	20.9	1.0

[1]FEET ABOVE INTERSTATE 295
[2]FEET ABOVE US ROUTE 17
[3]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY
[4]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER
[5]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ATLANTIC OCEAN

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

TROUT RIVER—NASSAU RIVER / THOMAS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
CEDAR CREEK								
A	19,227	147	1116	2.8	6.0	1.2[3]	2.0	0.8
B	21,527	201	1124	2.8	6.0	2.1[3]	2.7	0.6
C	26,794	192	933	2.7	6.0	4.0[3]	4.3	0.3
D	29,860	75	595	4.2	6.0	5.3[3]	5.6	0.3
E	32,410	96	811	2.9	6.3	6.3	6.7	0.4
F	34,723	100	758	2.3	6.7	6.7	7.4	0.7
G	37,673	311	2171	.8	7.4	7.4	8.3	0.9
H	40,939	93	740	2.4	9.4	9.4	10.2	0.8
I	41,710	58	528	2.9	10.3	10.3	10.8	0.5
LITTLE CEDAR CREEK								
A	1525[2]	81	435	3.1	6.0	1.7[3]	2.7	1.0
B	3487[2]	62	344	3.9	6.0	3.5[3]	3.9	0.4
C	6307[2]	120	694	1.9	6.0	5.7[3]	6.5	0.8
D	8242[2]	50	365	3.5	6.8	6.8	7.6	0.8
E	8965[2]	79	597	2.1	8.7	8.7	9.4	0.7
F	10,780[2]	91	508	2.5	9.5	9.5	10.2	0.7
G	12,395[2]	59	284	3.5	11.5	11.5	12.3	0.8
H	15,185[2]	73	254	2.9	16.2	16.2	16.6	0.4

[1]FEET ABOVE HECKSCHER DRIVE
[2]FEET ABOVE MOUTH
[3]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

CEDAR CREEK—LITTLE CEDAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
CEDAR SWAMP CREEK								
A	2,276	37	222	4.5	9.2	9.0[2]	10.0	1.0
B	5,076	78	295	3.1	13.1	13.1	13.9	0.8
C	10,148	66	292	2.7	20.0	20.0	20.8	0.8
D	12,818	81	417	1.7	23.4	23.4	24.4	1.0
E	15,708	57	241	2.7	26.4	26.4	27.4	1.0
F	19,268	55	232	2.1	30.9	30.9	31.3	0.4
G	20,208	33	166	2.7	31.5	31.5	32.2	0.7
H	20,718	42	246	1.6	31.6	31.6	32.6	1.0
BIG DAVIS CREEK								
A	4,500	649	2893	0.8	6.4	6.0[3]	7.0	1.0
B	6,723	875	3437	0.7	7.0	7.0	7.8	0.8
C	10,248	505	1343	1.6	8.8	8.8	9.8	1.0
D	10,473	191	1048	2.1	12.5	12.5	12.5	0.0
E	14,448	356	1483	0.8	14.5	14.5	15.5	1.0
F	16,518	293	714	1.8	18.9	18.9	19.2	0.3

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM PABLO CREEK
[3]ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM JULINGTON CREEK

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

CEDAR SWAMP CREEK—BIG DAVIS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
DUNN CREEK								
A	9632	665	2087	1.5	6.0	-0.1[3]	0.9	1.0
B	9984	495	2587	1.2	6.0	0.1[3]	1.0	0.9
C	14,484	1113	1566	1.9	6.0	1.2[3]	1.8	0.6
D	22,134	81	770	2.5	6.0	4.4[3]	5.2	0.8
E	27,534	159	985	2.0	6.0	5.4[3]	6.0	0.9
F	30,494	154	1186	1.6	6.0	5.9[3]	6.3	0.9
G	33,754	174	976	1.4	6.0	7.1	6.8	0.9
H	35,154	110	583	2.3	7.1	7.1	8.0	0.9
I	36,905	115	786	1.7	8.5	8.5	9.4	0.9
J	40,155	27	187	5.7	10.6	10.6	11.5	0.9
K	43,905	35	166	3.2	14.4	14.4	15.3	0.9
L	50,105	27	72	5.1	21.9	21.9	21.9	0.0
DUNN CREEK TRIBUTARY 1								
A	545[2]	113	476	1.9	6.0	3.8[3]	4.8	1.0
B	3525[2]	80	365	2.1	8.4	8.4	9.3	0.9
C	6160[2]	28	152	4.3	14.1	14.1	14.3	0.2
D	6961[2]	328	1265	0.5	19.1	19.1	20.1	1.0
DUNN CREEK TRIBUTARY 2								
A	1050[2]	14	59	5.4	17.3	17.3	18.3	1.0
B	2341[2]	56	127	1.8	20.7	20.7	21.7	1.0
C	2595[2]	141	379	0.6	22.9	22.9	23.2	0.3

[1]FEET ABOVE HECKSCHER DRIVE
[2]FEET ABOVE MOUTH
[3]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

DUNN CREEK –

DUNN CREEK TRIBUTARY 1–DUNN CREEK TRIBUTARY 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
GINHOUSE CREEK								
A	0	293	949	1.0	6.0	3.5[4]	4.5	1.0
B	725	37	189	5.2	6.0	4.4[4]	5.3	0.9
C	1989	444	4565	0.2	10.3	10.3	11.0	0.7
D	3535	26	162	5.3	10.3	10.3	10.7	0.4
E	5925	133	560	1.2	12.4	12.4	13.4	1.0
F	8182	30	142	3.7	18.2	18.2	18.5	0.3
G	10,016	17	71	5.5	24.2	24.2	24.2	0.0
H	11,421	17	40	7.1	31.7	31.7	31.9	0.2
I	12,124	31	174	1.6	36.0	36.0	36.6	0.6
DURBIN CREEK								
A	8000[2]	270[3]	2009	2.8	4.0	0.4[4]	1.4	1.0
B	11,950[2]	180[3]	1211	4.6	4.0	3.4[4]	4.1	0.7
C	14,330[2]	499[3]	3090	1.8	5.2	5.2	6.1	0.9
D	20,230[2]	1124[3]	7422	0.8	7.9	7.9	8.9	1.0

[1]FEET ABOVE LIMIT OF DETAILED STUDY (75 FEET DOWNSTREAM FROM FORT CAROLINE ROAD)
[2]FEET ABOVE MOUTH
[3]THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY
[4]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

GINHOUSE CREEK—DURBIN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
GOODBYS CREEK								
A	5740	134	539	2.7	5.0	1.7[3]	2.6	0.9
B	8130	539[2]	651	1.9	5.1	5.1	5.1	0.0
C	10,400	47	143	3.8	9.7	9.7	10.1	0.4
D	11,320	36	243	2.0	14.8	14.8	15.5	0.7
GOODBYS CREEK TRIBUTARY 1								
A	4130	44	224	0.8	22.5	22.5	23.4	0.9
GOODBYS CREEK TRIBUTARY 2								
A	3600	32	205	2.1	17.9	17.9	18.9	1.0
GOODBYS CREEK TRIBUTARY 3								
A	2560	27	133	2.6	12.4	12.4	13.3	0.9

[1]FEET ABOVE MOUTH
[2]COMBINED FLOODWAY WIDTH OF GOODBYS CREEK AND GOODBYS TRIBUTARY 3
[3]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

GOODBYS CREEK—GOODBYS CREEK TRIBUTARY 1—GOODBYS CREEK TRIBUTARY 2—GOODBYS CREEK TRIBUTARY 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
JONES CREEK								
A	1500	61	367	3.3	6.0	4.2[2]	5.2	1.0
B	3525	45	315	3.9	6.0	5.5[2]	6.3	0.8
C	4825	69	342	3.6	7.0	7.0	7.8	0.8
D	6575	81	283	3.7	12.1	12.1	12.8	0.7
E	9968	112	488	1.7	18.3	18.3	19.2	0.9
F	11,861	59	218	3.0	23.8	23.8	23.8	0.0
G	13,817	20	77	6.7	32.1	32.1	32.6	0.5
H	14,367	29	224	2.3	37.8	37.8	38.3	0.5
I	14,842	56	331	1.3	38.0	38.0	38.9	0.9
J	15,282	38	271	1.6	39.2	39.2	40.2	1.0
K	15,391	53	337	1.3	39.2	39.2	40.2	1.0
L	16,991	46	184	1.5	39.4	39.4	40.4	1.0
JONES CREEK TRIBUTARY								
A	1540	36	57	5.4	25.0	25.0	25.0	0.0
B	2215	16	57	4.8	28.0	28.0	28.6	0.6
C	2977	24	94	2.9	31.5	31.5	32.4	0.9
D	3712	17	57	3.7	35.0	35.0	35.8	0.8
E	5129	28	109	1.6	36.2	36.2	37.0	0.8
F	5279	22	69	2.5	36.3	36.3	37.1	0.8
G	6777	30	104	1.1	37.5	37.5	38.2	0.7

[1]FEET ABOVE MOUTH

[2]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

JONES CREEK – JONES CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
GREENFIELD CREEK								
A	0	243	1341	0.6	7.0	0.1[4]	1.1	1.0
B	5800	879	881	1.0	7.0	0.4[4]	1.2	0.8
C	12,000	88	233	2.4	7.0	3.2[4]	3.9	0.7
D	16,640	28	84	4.1	9.0	9.0	9.0	0.0
E	19,474	21	52	2.2	13.7	13.7	14.3	0.6
JULINGTON CREEK								
A	1050[2]	308	2914	2.0	4.0	3.0[5]	4.0	1.0
B	4600[2]	215	2370	2.4	4.0	3.4[5]	4.3	0.9
C	7280[2]	147	2242	2.6	4.0	3.7[5]	4.6	0.9
D	12,380[2]	981	3896	1.4	4.5	4.5	5.3	0.8
E	16,380[2]	1136	6387	0.8	6.0	6.0	7.0	1.0
F	18,530[2]	557	3931	0.9	6.3	6.3	7.3	1.0
G	22,556[2]	1077	6885	0.4	6.9	6.9	7.9	1.0
H	25,206[2]	578[3]	2492	1.0	7.5	7.5	8.5	1.0
I	27,725[2]	209	801	2.3	11.1	11.1	11.8	0.7
J	28,376[2]	380	1977	1.0	12.2	12.2	13.1	0.9
K	34,476[2]	535	2534	0.6	14.5	14.5	15.5	1.0
L	35,004[2]	136	662	2.3	15.2	15.2	15.8	0.6
M	35,354[2]	222	1018	1.5	15.6	15.6	16.4	0.8

[1]FEET ABOVE LIMIT OF DETAILED STUDY (3.2 MILES DOWNSTREAM FROM ATLANTIC BOULEVARD
[2]FEET ABOVE MOUTH
[3]COMBINED FLOODWAY WIDTH OF JULINGTON CREEK AND SWEETWATER CREEK
[4]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM INTRACOASTAL WATERWAY
[5]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVERABLE 5

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

GREENFIELD CREEK—JULINGTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
MT. PLEASANT CREEK								
A	0	344	670	2.9	7.0	-1.5[3]	-0.5	1.0
B	4972	634	1258	1.5	7.0	3.1[3]	3.1	0.0
C	9622	197	812	1.9	7.0	5.2[3]	5.3	0.1
D	14,222	134	714	2.1	19.0	19.0	20.0	1.0
OLDFIELD CREEK								
A	3040[2]	129	469	3.1	4.0	3.4[3]	4.3	0.9
B	10,950[2]	128	600	1.3	13.6	13.6	14.6	1.0
OLDFIELD CREEK TRIBUTARY 1								
A	1800[2]	36	144	2.7	12.3	12.3	13.3	1.0
B	2700[2]	50	148	2.6	14.7	14.7	15.7	1.0
C	3616[2]	55	396	0.8	21.0	21.0	21.8	0.8
D	5016[2]	37	172	1.8	21.1	21.1	22.0	0.9

[1]FEET ABOVE LIMIT OF DETAILED STUDY (100 FEET DOWNSTREAM FROM MT. PLEASANT ROAD)
[2]FEET ABOVE MOUTH
[3]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

MT. PLEASANT CREEK –
OLDFIELD CREEK – OLDFIELD CREEK TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
OPEN CREEK								
A	1000	359	1015	1.7	5.9	0.6[2]	0.4	1.0
B	2475	109	455	3.7	5.2	0.6[2]	0.9	0.3
C	4325	97	290	5.8	5.0	3.2[2]	3.4	0.2
D	6725	291	1331	1.1	5.9	5.9	6.7	0.8
E	8345	124	585	2.5	6.9	6.9	7.4	0.5
F	10,870	112	604	2.0	10.2	10.2	11.2	1.0
G	14,340	34	208	3.5	17.3	17.3	17.6	0.3
H	19,185	37	136	0.9	24.8	24.8	25.1	0.3
I	19,355	13	58	2.2	24.8	24.8	25.8	1.0
OPEN CREEK TRIBUTARY 1								
A	1350	67	357	1.3	8.0	8.0	8.9	0.9
B	4105	22	84	3.7	10.6	10.6	11.6	1.0
OPEN CREEK TRIBUTARY 2								
A	1930	20	68	4.5	14.8	14.8	14.9	0.1
B	3430	37	105	2.5	19.5	19.5	20.2	0.7

[1]FEET ABOVE MOUTH
[2]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM INTRACOASTAL WATERWAY

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

OPEN CREEK—
OPEN CREEK TRIBUTARY 1—OPEN CREEK TRIBUTARY 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
PABLO CREEK								
A	5202	135	806	5.0	6.0	2.9[2]	2.9	0.0
B	12,255	747	3566	0.9	7.8	7.8	8.6	0.8
C	15,055	730	4152	0.7	8.9	8.9	9.9	1.0
D	18,655	600	3864	0.7	10.0	10.0	11.0	1.0
E	24,455	220	1147	1.9	12.5	12.5	13.3	0.8
F	28,055	221	1199	1.7	16.2	16.2	16.9	0.7
G	29,271	224	2292	0.9	19.0	19.0	19.7	0.7
H	30,421	193	1773	1.1	19.2	19.2	20.0	0.8
SAWMILL SLOUGH								
I	36,671	825	4443	0.1	19.7	19.7	20.7	1.0
J	39,571	20	69	6.2	19.6	19.6	20.6	1.0
K	40,231	115	216	2.0	21.7	21.7	22.2	0.5
L	41,224	45	175	2.2	24.1	24.1	24.1	0.0
M	42,273	53	213	1.8	28.1	28.1	29.0	0.9
N	43,573	84	240	1.4	30.7	30.7	31.6	0.9
O	46,073	173	453	0.5	32.0	32.0	32.7	0.7
P	47,371	33	67	3.6	32.4	32.4	32.8	0.4
Q	49,319	61	189	1.3	34.4	34.4	35.2	0.8
R	52,124	67	324	0.5	35.5	35.5	36.5	1.0

[1]FEET ABOVE COUNTY BOUNDARY
[2]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM INTRACOASTAL WATERWAY

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

PABLO CREEK/SAWMILL SLOUGH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
SAWMILL SLOUGH DIVERGENCE CHANNEL								
A	900	60	175	2.2	24.1	24.1	24.1	0.0
B	2050	105	213	1.8	28.1	28.1	29.0	0.9
POTTSBURG CREEK								
A	0[2]	332	2371	1.4	5.0	3.2[3]	4.2	1.0
B	2549[2]	193	1823	1.9	5.0	3.4[3]	4.3	0.9
C	8099[2]	212	1979	1.7	5.0	3.8[3]	4.7	0.9
D	12,349[2]	197	2008	1.6	5.0	4.1[3]	4.9	0.8
E	16,249[2]	204	1939	1.5	5.0	4.3[3]	5.1	0.8
F	18,763[2]	153	1228	2.4	5.0	4.7[3]	5.4	0.7
G	23,317[2]	330	1646	1.6	7.3	7.3	7.8	0.5
H	27,812[2]	316	1813	1.2	9.8	9.8	10.8	1.0
I	31,615[2]	132	649	2.8	10.6	10.6	11.4	0.8
J	35,210[2]	130	715	2.4	12.3	12.3	12.7	0.4
K	36,270[2]	142	495	3.4	13.2	13.2	13.3	0.1
L	41,370[2]	368	1827	0.3	16.2	16.2	17.2	1.0
M	44,570[2]	340	975	0.3	16.5	16.5	17.5	1.0

[1]FEET ABOVE CONFLUENCE WITH SAWMILL SLOUGH
[2]FEET ABOVE LIMIT OF DETAILED STUDY (75 FEET DOWNSTREAM FROM ATLANTIC BOULEVARD
[3]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

FLOODWAY DATA

SAWMILL SLOUGH DIVERGENCE CHANNEL—
POTTSBURG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
SHERMAN CREEK								
A	448	48	298	0.8	7.4	7.4	8.0	0.6
B	833	66	289	0.7	7.7	7.7	8.3	0.6
C	1231	70	250	0.8	7.8	7.8	8.5	0.7
D	4166	82	452	1.0	7.9	7.9	8.8	0.9
E	5966	86	535	0.8	7.9	7.9	8.9	1.0
SHERMAN CREEK CANAL								
A	3700[2]	76	253	2.3	7.0	0.9[4]	0.1	1.0
B	6060[2]	50	261	2.2	7.0	5.7[4]	5.8	0.1
C	7779[2]	34	190	3.0	7.5	7.5	7.9	0.4
D	9494[2]	50	291	1.1	8.0	8.0	8.7	0.7
E	12,213[2]	45	257	0.8	9.1	9.1	9.7	0.6
F	12,846[2]	35	274	0.8	9.1	9.1	9.8	0.7
G	13,213[2]	38	296	0.7	9.2	9.2	9.9	0.7
H	13,644[2]	157[3]	1078	0.2	9.2	9.2	9.9	0.7

[1]FEET ABOVE WONDERWOOD DRIVE
[2]FEET ABOVE MOUTH
[3]THIS WIDTH EXTENDS WITHIN AREA NOT INCLUDED

[4]ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM INTRACOASTAL WATERWAY

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

SHERMAN CREEK—SHERMAN CREEK CANAL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
STRAWBERRY CREEK								
A	3000	234	1346	1.7	5.0	4.7[3]	5.5	0.8
B	7200	91	402	2.7	11.5	11.5	11.9	0.4
C	8652	100	501	2.2	14.4	14.4	15.1	0.7
D	9800	90	724	1.5	20.3	20.3	20.8	0.5
E	11,800	103	606	1.8	22.9	22.9	23.9	1.0
F	12,782	87	380	2.9	25.8	25.8	26.8	1.0
G	14,700	43	331	3.3	34.6	34.6	35.3	0.7
H	15,458	54	291	2.4	35.1	35.1	36.1	1.0
I	20,000	50	76	4.3	38.1	38.1	38.6	0.5
SWEETWATER CREEK								
A	250	578[2]	2492	1.0	7.5	7.5	8.5	1.0
B	2600	166	667	1.8	10.1	10.1	11.0	0.9
C	2876	39	322	3.7	11.1	11.1	12.0	0.9
D	3095	90	456	2.6	11.7	11.7	12.7	1.0
E	3629	168	1067	1.1	13.9	13.9	14.7	0.8
F	6104	159	606	1.5	16.4	16.4	17.4	1.0
G	6454	63	186	4.9	17.7	17.7	18.5	0.8
H	7125	78	319	2.9	21.6	21.6	22.2	0.6
I	7554	73	353	2.6	22.3	22.3	23.0	0.7
J	7829	80	654	1.4	22.6	22.6	23.4	0.8
K	9109	89	436	2.1	23.4	23.4	24.1	0.7
L	9504	92	448	2.1	23.7	23.7	24.7	1.0

[1] FEET ABOVE MOUTH
[2] COMBINED FLOODWAY WIDTH OF JULINGTON CREEK AND SWEETWATER CREEK
[3] ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHN'S RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

STRAWBERRY CREEK—SWEETWATER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
TIGER POND CREEK								
A	1200	30	150	5.4	7.0	5.0[2]	6.0	1.0
B	3100	49	166	3.2	9.8	9.8	10.8	1.0
C	6000	17	85	4.0	18.4	18.4	19.1	0.7
TIGER HOLE SWAMP								
A	1580	306	896	0.8	17.0	17.0	18.0	1.0
B	3895	25	118	5.1	19.5	19.5	20.5	1.0
BOX BRANCH								
A	3200	247	1061	1.7	5.6	5.6	6.6	1.0
B	5600	396	2101	0.9	7.5	7.5	8.5	1.0
C	9840	243	1178	1.3	10.5	10.5	11.4	0.9
CANEY BRANCH								
A	900	117	727	1.6	6.0	5.3[2]	6.3	1.0
B	4360	116	743	1.5	6.1	6.1	7.1	1.0
C	6120	107	343	3.0	6.6	6.6	7.6	1.0
D	8740	57	378	2.5	10.6	10.6	11.6	1.0
E	10,520	36	273	3.1	13.1	13.1	13.8	0.7
F	12,020	24	133	2.3	15.3	15.3	16.3	1.0

[1] FEET ABOVE MOUTH
[2] ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECT FROM ST. JOHNS RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

TIGER POND CREEK—TIGER HOLE SWAMP—
BOX BRANCH—CANEY BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
CORMORANT BRANCH								
A	1050	76	593	1.7	4.0	2.7	3.6	0.9
B	5640	44	94	7.9	6.2	6.2	6.2	0.0
C	8970	96	408	1.5	12.1	12.1	12.4	0.3
D	11,840	96	496	0.8	15.0	15.0	16.0	1.0
MILL DAM BRANCH								
A	3600	137	751	2.0	23.3	23.3	24.3	1.0
B	4300	136	756	2.0	24.1	24.1	25.1	1.0
C	5600	68	392	3.8	26.2	26.2	26.8	0.6
D	7825	74	474	2.9	29.8	29.8	30.7	0.9
E	13,264	99	545	2.0	33.6	33.6	34.2	0.6
F	16,964	205	945	0.9	34.9	34.9	35.6	0.7
G	17,564	235	530	1.6	35.0	35.0	35.8	0.8
H	20,594	33	142	2.7	36.1	36.1	37.0	0.9
I	21,844	44	209	1.8	38.0	38.0	38.7	0.7
RED BAY BRANCH								
A	1580	134	599	1.3	6.9	6.9	7.9	1.0
B	4512	183	1085	0.9	10.8	10.8	11.8	1.0

(FEET ABOVE MOUTH
ELEVATIONS WITHOUT CONSIDERING STORM SURGE EFFECTS FROM ST. JOHNS RIVER

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL

(DUVAL CO.)

FLOODWAY DATA

CORMORANT BRANCH—MILL DAM BRANCH—RED BAY BRANCH

FLOODING SOURCE					BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET NGVD)
RUSHING BRANCH							
A	1080	191	341	4.1	2.9	3.9	1.0
B	4200	118	81	1.7	4.5*	5.4	0.9
C	6000	50	210	4.8	5.6*	6.6	1.0
D	8600	107	341	4.1	8.2	8.9	0.7
SECOND PUNCHEON BRANCH							
A	1110	58	180	2.8	19.5	20.5	1.0
B	2250	58	180	2.8	23.5	24.5	1.0
C	5410	58	180	2.8	27.1	27.8	0.7
D	8170	60	180	2.8	32.2	33.2	1.0
E	10,810	150	1081	0.5	32.6	33.6	1.0
F	14,040	45	540	0.9	36.6	36.6	0.0
G	16,600	47	540	0.9	38.3	38.4	0.1
H	19,210	47	540	0.9	40.3	40.3	0.0
I	21,310	60	540	0.9	42.2	42.2	0.0
J	24,410	47	540	0.9	44.2	44.2	0.0
K	27,360	47	540	0.9	45.3	45.4	0.1

*FEET ABOVE MOUTH
*ELEVATIONS WITHOUT CONSIDERING [illegible]

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF JACKSONVILLE, FL
(DUVAL CO.)

FLOODWAY DATA

RUSHING BRANCH—SECOND PUNCHEON BRANCH

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 foot and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 foot and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

Flood Insurance Studies published for Clay County, Nassau County, and St. Johns County, Florida (References 22-24) are not in agreement with this study because of recently developed analyses used in this study. However, the Flood Insurance Studies for Clay, Nassau, and St. Johns Counties will be revised in the future to agree with this study.

Flood Insurance Studies in progress for the Cities of Jacksonville Beach, Neptune Beach, and Atlantic Beach, Florida (References 25-27) are in agreement with this study.

This Flood Insurance Study supersedes the previously published Flood Insurance Study for the City of Jacksonville (Reference 1).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, N.E., Suite 736, Atlanta, Georgia 30309.

9.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, City of Jacksonville, Duval County, Florida, December 1983.

2. U.S. Army Corps of Engineers and City of Jacksonville, Florida, Metropolitan Jacksonville, Florida Water Resources Study, Plan Formulation Appendix, Annex III, Flood Plain Management, August 1980.

3. U.S. Army Corps of Engineers, Jacksonville District, Special Flood Hazard Information Report, Hogans Creek, Jacksonville, Florida, July 1971.

4. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Florida, Washington, D.C., February 1982.

5. ----------, National Oceanic and Atmospheric Administration, National Climatic Center, Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1951-1980, Florida, Asheville, North Carolina, September 1982.

6. U.S. Geological Survey, Water Resources Investigations Report 82-4012, Techniques for Estimating Magnitude and Frequency of Floods on Natural-Flow Streams in Florida, 1982.

7. ----------, Water Supply Paper 2207, Flood Characteristics of Urban Watersheds in the United States, 1984.

8. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Data Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.

9. U.S. Department of Commerce, Environmental Science Services Administration, Technical Memorandum WBTM, Hydro 11, Joint Probability Method of Tide Frequency Analysis Applied to Atlantic City and Long Beach Island, New Jersey, Vance A. Myers, April 1970.

10. ----------, National Oceanic and Atmospheric Administration, National Weather Service, Tropical Cyclones of the North Atlantic Ocean, 1871-1984, July 1985.

11. ----------, National Oceanic and Atmospheric Administration, Technical Report NWS 15, Some Climatological Characteristics of Hurricanes and Tropical Storms, Gulf and East Coasts of the United States, Frances P. Ho, Richard W. Schwerdt, and Hugo V. Goodyear, May 1975.

12. ----------, National Oceanic and Atmospheric Administration, Technical Report NWS 23, Meteorological Criteria for Standard Project Hurricane and Probable Maximum Hurricane Wind Fields, Gulf and East Coasts of the United States, Richard W. Schwerdt, Francis P. Ho, and Roger R. Watkins, September 1979.

13. Federal Emergency Management Agency, Coastal Flooding Storm Surge Model, SURGE, 1988.

14. U.S. Army Corps of Engineers, Coastal Engineering Research Center, Shore Protection Manual, Vicksburg, Mississippi, 1984.

15. ----------, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

16. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 10 Feet: Trout River and Jacksonville Beach, Florida, 1964, photorevised 1981; Eastport and Mayport, Florida, 1964, photorevised 1970; Arlington, Florida, 1963, photorevised 1970; Fiftone, Florida, 1949, photorevised 1970; Jacksonville Heights, Florida, 1964, photorevised 1978; Contour Interval 5 Feet: Callahan, Florida, 1970, photorevised 1981; Italia,

Hedges, and Amelia City, Florida, 1958, photorevised 1970; Bryceville, Dinsmore, and Baldwin, Florida, 1964; Macclenny East, Florida, 1972; Marietta and Jacksonville, Florida, 1964, photorevised 1982; Maxville, Florida, 1970; Orange Park, Bayard, and Palm Valley, Florida, 1964, photorevised 1981; and Fleming Island, Orangedale, and Durbin, Florida, 1952, photorevised 1970.

17. Florida Department of Transportation, Duval County Aerial Photographs (stereo pairs), 1984.

18. National Academy of Sciences, Methodology for Calculating Wave Action Effects Associated with Storm Surges, Prepared by a Panel of the Science and Engineering Program on the Prevention and Mitigation of Flood Losses, Building Research Advisory Board Commission on Socio-Technical Systems, National Research Council, 1977.

19. Federal Emergency Management Agency, Users Manual for Wave Height Analysis, February 1981.

20. Hill, J. and Herchenroder, B., Computation Model for Computing Dune Erosion, Proceedings from ASCE Hydraulics Specialty Conference, Orlando, Florida, August 1985.

21. Federal Emergency Management Agency, Manual for Wave Runup Analysis, Coastal Flood Insurance Studies, November 1981.

22. ----------, Flood Insurance Study, Clay County, Unincorporated Areas, Florida, May 1987.

23. ----------, Flood Insurance Study, Nassau County, Unincorporated Areas, Florida, May 1988.

24. ----------, Flood Insurance Study, St. Johns County, Unincorporated Areas, Florida, September 1985.

25. ----------, Flood Insurance Study, City of Jacksonville Beach, Duval County, Florida, April 1983, revision in progress.

26. ----------, Flood Insurance Study, City of Neptune Beach, Duval County, Florida, April 1983, revision in progress.

27. ----------, Flood Insurance Study, City of Atlantic Beach, Duval County, Florida, April 1983, revision in progress.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
30	0234	13.39	railroad spike in 15-inch pine located about 172 feet south of Sandy Drive, 44 feet west of Girvin Road
31	0234	8.51	top of post located about 0.4 mile northeast of intersection of State Road 105 and McKenna Drive
32	0233	26.50	railroad spike in 12-inch pine located about 125 feet south of Girvin Road, 70 feet west of Ivylena Road
33	0233	28.29	cross chiseled on headwall located about 217 feet west of Girvin Road, 34 feet north of Atlantic Boulevard
34	0232	34.98	cross chiseled in headwall located in northwest corner of intersection of Fort Caroline Road and Monument Point Road
35	0232	30.19	railroad spike in 10-inch pine located about 48 feet west of intersection of Spanish Point Drive and Mount Pleasant Road
36	0232	5.14	top of concrete post located about 90 feet southwest of intersection of State Road 105 and McKenna Drive
37	0232	23.89	top of southeast abutment of State Road 105 bridge over Sisters Creek
38	0231	10.36	disk located on northeast corner of Fort Caroline Road bridge over Jones Creek
39	0231	29.58	chiseled cross on curb located about 113 feet south of intersection of Monument Road and Lee Road

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
40	0231	6.08	disk located on southwest corner of Fort Caroline Road bridge over Ginhouse Creek
41	0231	10.19	drill hole in headwall located at southeast end of box culvert for Ginhouse Creek under Monument Road
42	0231	18.82	drill hole in top of southwest guardrail post on south side of Lone Star Road bridge over Ginhouse Creek
43	0231	18.94	drill hole in top center of north headwall of box culvert for Ginhouse Creek under Seal Road
44	0227	41.08	bridge spike in 12-inch scrub oak located on southwest corner of intersection of Lee Road and Lone Star Road
45	0227	35.20	cross chiseled in top center of south headwall of box culvert for Jones Creek under Atlantic Boulevard
46	0227	38.67	drill hole in top curb on south side of Atlantic Boulevard bridge over Jones Creek Tributary
47	0227	39.16	chiseled cross on base of light pole located southwest of intersection of Debutante Drive and Atlantic Boulevard
48	0227	35.82	drill hole in top center of south headwall of twin 36-inch pipe culverts for Jones Creek under Eymes Road
49	0227	34.72	drill hole in top center of twin pipe culvert for Jones Creek Tributary under Agave Road

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
50	0227	36.04	drill hole in top center of south headwall of two 2.5-foot-diameter metal culverts under Agave Road at Ginhouse Creek
51	0227	39.96	40d nail in power pole located about 0.4 mile south of intersection of Herndon Road and Glen Gardner Drive, about 25 feet west of centerline of Glen Gardner Drive
52	0227	34.45	drill hole in center of sidewalk on south side of Lawson Road bridge over Ginhouse Creek
53	0218	17.91	chiseled cross on driveway headwall located about 200 feet east of intersection of Julington Creek Road and Gathering Oaks Drive
54	0218	8.40	chiseled square on northeast headwall of Old St. Augustine Road bridge over Julington Creek
55	0218	43.01	Department of Transportation disk stamped "I-95 72 A08F" set in southeast end of Greenland Road bridge over Interstate 95
56	0218	14.31	drill hole in northeast corner of storm drain located at center of Interstate 295 median over Julington Creek
57	0218	12.98	drill hole in south end of east headwall of Greenland Road bridge over Sweetwater Creek
58	0218	9.23	railroad spike in 14-inch oak located south of Greenland Road bridge over Julington Creek
59	0229	40.73	chiseled cross on southeast side of intersection of Saint John's Bluff Road and Central Parkway

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
60	0220	36.04	drill hole in southwest headwall of box culvert for Sawmill Slough under Central Parkway
61	0226	14.57	brass disk in northeast abutment wall of Beach Boulevard bridge over Pottsburg Creek
62	0226	15.16	chiseled cross in sidewalk on southwest corner of intersection of Hogan Road and Mills Road
63	0226	12.32	drill hole in northwest end of Hogan Road bridge over Pottsburg Creek
64	0226	16.23	Department of Transportation disk in southwest corner of Bowden Road bridge over Pottsburg Creek
65	0214	3.90	drill hole in top center of wall located at south end of Hood Landing Road
66	0219	23.34	chiseled square in northeast headwall of box culvert for Sweetwater Creek under U.S. Route 1
67	0228	28.08	railroad spike in 15-inch pine located in southwest corner of intersection of Bowden Road and Tiger Hole Road
68	0228	16.61	Department of Transportation disk set in northwest corner of Belfort Road bridge over Pottsburg Creek
69	0228	18.72	chiseled cross in headwall located about 365 feet northeast of intersection of South Bowden Road and Belfort Road
70	0228	17.25	chiseled cross on west corner of eastbound J. Turner Butler Boulevard bridge over Pottsburg Creek

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
71	0217	19.35	drill hole in top of curb located about 33 feet south of centerline of Baymeadows Road bridge over Pottsburg Swamp
72	0217	16.71	chiseled square in southwest headwall of box culvert for Julington Creek under U.S. Route 1
73	0131	9.98	chiseled cross on southeast end of Normandy Boulevard bridge over the Cedar River
74	0131	9.05	chiseled cross on top of headwall located on northeast corner of Grace Lane bridge over the Cedar River
75	0131	13.59	chiseled cross in southeast corner of guardrail of Ramona Boulevard bridge over the Cedar River
76	0131	14.98	chiseled cross on north end of median curb of Lane Avenue bridge over Interstate 10
77	0131	12.09	chiseled cross on south headwall of Stuart Avenue bridge over the Cedar River
78	0131	12.55	U.S. Coast and Geodetic Survey brass disk stamped "No. DC-FC-1" set on southeast corner of headwall of Lane Avenue bridge over the Cedar River
79	0131	15.74	chiseled cross on signal box pad located in northeast corner of intersection of Lane Avenue and Highway Avenue
80	0131	18.48	60d nail in southwest end of CSX railroad bridge over the Cedar River
81	0131	17.39	nail in 14-inch pine located at north end of Monte Street just south of the Cedar River

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
82	0131	21.58	chiseled cross on northwest headwall of southbound Interstate 295 bridge over the Cedar River
83	0131	21.90	chiseled cross on southeast corner of Pickettville Road bridge over the Cedar River
84	0133	11.82	chiseled cross in southeast corner of San Juan Boulevard bridge over the Cedar River
85	0133	9.75	chiseled cross on corner of transformer pad located about 34 feet southwest of intersection of Snug Harbor Lane and Mardis Place
86	0133	15.84	chiseled cross in northeast corner of Lane Avenue bridge over the Cedar River
87	0133	10.65	chiseled cross in southeast corner of Lenox Avenue bridge over the Cedar River
88	0141	17.54	brass disk on southeast side of Blanding Boulevard bridge over the Cedar River
89	0154	17.1[illegible]	chiseled cross on concrete pump island at southwest corner of intersection of East 63rd Street and Main Street
90	0156	12.54	brass disk set in southeast corner of North Main Street bridge over the Broward River
91	0156	12.83	Department of Transportation brass disk stamped "No. N-7" set on northeast corner of southbound Interstate 95 bridge over the Broward River

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DISCRIPTION OF LOCATION
92	0156	11.24	chiseled cross on south corner of transformer pad located at intersection of Turtle Creek Drive South and Quail Hollow Drive
93	0158	14.51	chiseled cross on headwall located at northeast corner of intersection of Faye Road and Dunn Creek Road
94	0159	20.11	city monument located northeast of intersection of Yellow Bluff Road and New Berlin Road
95	0159	14.37	drill hole in northeast curb on New Berlin Road bridge over Caney Branch
96	0159	15.42	drill hole in south headwall of box culvert for Rushing Branch under New Berlin Road
97	0159	16.35	40d nail in power pole no. 12084 located at end of Yellow Bluff Road on west side of road
98	0169	9.49	top of southeast abutment of Heckscher Drive bridge over Clapboard Creek
99	0187	15.67	railroad spike in 15-inch pine located at southwest corner of intersection of Sawpit Road and Shark Road
100	0187	14.85	top of northwest walkway above abutment of State Road A1A bridge over the Nassau River
101	0186	15.23	cross chiseled on concrete slab entrance to church building located in northeast corner of intersection of Cedar Point Road and Boney Road
102	0163	9.02	U.S. Coast and Geodetic Survey and State Survey disk stamped "AJ 18" set in top of concrete post located about 605 feet east of east end of Atlantic Boulevard bridge over Big Pottsburg Creek, about 54 feet south of centerline of Atlantic Boulevard

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
103	0157	11.45	chiseled cross on northeast end of curb of New Berlin Road bridge over Dunn Creek
104	0157	21.84	railroad spike in 24-inch pine located southwest of intersection of Starrat Road and Duval Station Road
105	0157	19.61	PK nail in centerline of Webb Road at Dunn Creek Tributary 2 streamline
106	0157	17.25	drill hole in top center of south headwall of pipe for Dunn Creek Tributary 1 under New Berlin Road
107	0157	17.87	drill hole in top center of southeast headwall of box culvert for Dunn Creek Tributary 1 under Starrat Road
108	0157	14.62	Department of Transportation disk set in top of southwest headwall of Dunn Creek Road bridge over Dunn Creek
109	0070	20.57	chiseled cross in southeast headwall of Airport Road bridge over Little Cedar Creek
110	0070	14.83	chiseled cross on top of guardrail of Duval Road bridge over Cedar Creek
111	0070	12.44	chiseled cross on headwall on south side of Interstate 295 bridge over Cedar Creek
112	0070	12.09	chiseled cross on headwall located on south side of eastbound Interstate 295 bridge over Little Cedar Creek
113	0070	19.59	chiseled cross on northeast corner of guardrail on Duval Road bridge over Little Cedar Creek

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
114	0070	36.42	top of concrete post located on west side of State Road 17 about 500 feet north of intersection of State Road 17 and Joel Lee Road
115	0065	8.91	chiseled cross in northeast corner of Biscayne Boulevard bridge over Cedar Creek
116	0065	9.07	60d nail in 10-inch power pole located on south side of VIP Road about 550 feet east of intersection of VIP Road and Armsdale Road
117	0065	18.06	Department of Transportation brass disk stamped "No. G-3" set on southwest corner of Interstate 295 northbound bridge over Trout Creek
118	0061	9.77	60d nail in 30-inch pine located at east end of Bowie Road
119	0061	8.10	chiseled cross on concrete pump island located in northeast corner of intersection of Dunn Avenue Terrace and U.S. Route 1
120	0061	15.64	chiseled cross on southeast headwall of CSX railroad bridge over the Trout River
121	0061	10.86	chiseled cross on southeast wingwall of Old Kings Road bridge over the Trout River
122	0086	11.36	U.S. Coast and Geodetic Survey brass disk (Half Moon No. 1 1934) located on southwest corner of U.S. Route 17 bridge over the Nassau River
123	0086	8.78	top of concrete post on west side of road located about 0.9 mile southwest of U.S. Route 17 bridge over the Nassau River

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
124	0086	17.56	top of concrete post located southwest of intersection of CSX railroad and private drive, about 250 feet north of Yellow Bluff Road
125	0087	13.11	chiseled cross in southwest corner of CSX railroad bridge over the Nassau River
126	0055	13.17	chiseled cross in southwest corner of Lem Turner road bridge over Thomas Creek
127	0055	14.00	brass disk located in southeast corner of U.S. Route 1 northbound bridge over Thomas Creek
128	0055	22.86	chiseled cross on base of railroad sign located at northeast corner of intersection of Acree Road and Norfolk Southern Railway
129	0055	20.37	chiseled cross in southeast corner of Norfolk Southern Railway bridge over Trout Creek
130	0078	18.26	Department of Transportation brass disk located at southeast corner of northbound Interstate 95 bridge over the Nassau River
131	0060	6.27	railroad spike in 16-inch oak located at end of Ethel Road near Thomas Creek on west side of road